ADVANCED MICROPROCESSOR

Subject Title : Advanced Microprocessor
Subject Code : EC
Hours Per Week : 04
Hours Per Semester : 64

TOPIC ANALYSIS

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On completion of the course the students should be able to:

1. Understand the Architecture and programming model of 8086
2. Comprehend the working of various types of programmable peripheral IC’S
3. Understand the instruction set and programming 8086
4. Comprehend the features of advanced microprocessors

COURSE CONTENTS

01. 8086 Microprocessor Architecture and Pin functions
    Microprocessor based system- Features of 8086-Internal architecture of 8086
    Pin details(functions) of 8086

02. 8086 Operating Modes and Addressing Modes
    Physical address calculation-Minimum mode configuration with timings
    Maximum mode configuration with timings- Memory organization of 8086
03. 8086 Instruction set, Assembler Directives And 8087 co-processor

Instruction format- Instruction set of 8086-Assembler directives-8087 Co-processor.

04. Program development steps and Assembly language programs

Program development process-8086 sample programs
Procedure & MACRO

05. 8086 Interrupts

Interrupts of 8086- Interrupt cycle of 8086 & Interrupt Vector table- Interrupt hierarchy
DOS & BIOS Interrupts

06. Programmable Peripheral ICs

Functional block diagram 8255 (PPI)-list operating modes- Functional block diagram 8253-List operating modes- Functional block diagram 8251 (USART)-list operating modes- Functional block diagram 8259 (PIC)-list operating modes-Functional block diagram 8257 and DMA operation

07. Advanced Microprocessors

Block diagram of advanced microprocessor-BIU-Cache-IU-FPU-MMU- Super scalar issue of instructions-Memory Hierarchy- Virtual memory, paging & segmentation- Pipe lining - pipe line hazards - Instruction level parallelism, Features of 80286, 80386, 80486, Pentium IV, Dual core processors

08. Bus standards- Need and different bus standards- Centronics - Serial RS 232 –I^2C
SATA - USB Bus standards

**TEXT BOOKS:**
1. Microprocessor - A P Godse & D A Godse (Technical Publications)
3. Advanced Microprocessors - Daniel Tabak (Tata Mc Graw Hill)

**REFERENCE BOOKS**
1. Advanced Microprocessors- By K Shashidhar, Sapna Publications TMH
SPECIFIC INSTRUCTIONAL OBJECTIVES

01. 8086 Microprocessor Architecture and Pin functions

1.1 Explain the block diagram of a Microprocessor based system
1.2 List the features of 8086
1.3 Explain the internal architecture of 8086
1.4 Explain flag register
1.5 Calculation of physical address
1.6 Explain pin details(functions) of 8086

(Refer Text 1)

02. 8086 Operating Modes and Addressing Modes

2.1 Explain minimum mode configuration and bus timing (Read & Write) of 8086
2.2 Explain maximum mode configuration and bus timing (Read & Write) of 8086
2.3 Explain physical memory organization of 8086
2.4 Explain addressing modes of 8086 with Examples

(Refer Text 1)

03. 8086 Instruction set , Assembler Directives & 8087 co-processor

3.1 Explain 8086 Instruction formats
3.2 Discuss instruction set
   Data transfer - Arithmetic and logical instructions
   Shift & Rotate-Branching instructions
   Loop control - String instructions
Processor control instructions
External Hardware synchronization instructions
3.3 Explain the various assembler directives
3.4 Know about co-processor
3.5 Features of 8087 co-processor
3.6 Explain the interaction between 8086 and 8087
(Refer Text 1)

04. Program development steps and Assembly language programs
4.1 Discuss program development process & execution of assembly language program
4.2 Write 8086 sample programs
   - Add and Subtract two 16 bit numbers
   - Data Block Move
   - Code Conversion (ASCII<-->HEX, BCD<-->HEX)
   - Largest/Smallest of Five numbers
   - Search a number in the array
   - Ascending/Descending order
   - To check Given string is Palindrome
   - To add 3X3 matrix
   - To read and display string using dos routine
4.3 Program to Illustrate Procedure & MACRO with example program.
   (Refer Text 1)

05. 8086 Interrupts
5.1 Explain Interrupts of 8086 – External & Internal interrupts
5.2 Explain Interrupt cycle of 8086, Interrupt Vector table & Interrupt priorities
5.3 Discuss DOS and BIOS Interrupt basics and difference between DOS & BIOS interrupts
   (Refer Text 1)

06. Programmable Peripheral ICs
6.1 Explain functional block diagram 8255 - Programmable Peripheral Interface and Explain different modes of operation
6.2 Explain functional block diagram 8253 - Programmable timer / counter & Mention the Operating modes (Refer Text 2)
6.3 Explain functional block diagram 8259 - Programmable interrupt controller and Mention the operating modes
6.4 Explain functional block diagram 8251 – USART and Mention the operating modes (Refer Text 2)
6.5 Explain functional block diagram 8257 - DMA controller and explain DMA operation state diagram (Refer Text 2)

(Refer Text 1 & Text 2)

07. Advanced Microprocessors

7.1 Explain the Block diagram of Advanced Microprocessor
7.2 Explain the Block Diagram and Functions of
   1. Bus Interface Unit
   2. Integer Unit
   3. Floating Point Unit
   4. Memory Management Unit
   5. Cache
7.3 To Know Super Scalar Issue of instructions
7.4 Explain Memory Hierarchy - Register file - Cache
7.5 Define virtual memory, paging & segmentation
7.6 Discuss Pipe lining - Pipe line hazards ,Instruction level parallelism
7.7 Features of 80286, 80386, 80486, Pentium IV, Dual core processors
   (Refer Text 3)

08. Bus standards

8.1 Discuss the Need for Bus standards
8.2 Explain Parallel Centrionics Bus
8.3 Explain Serial RS 232 Standard
8.4 Explain SATA Bus
8.5 Explain I²C Bus
8.5 Explain USB Bus standards
   Refer Text 1)
Instructions

1) Section I is compulsory
2) Answer any 2 full questions from Each Section II, III, IV
3) Maximum Marks: 100

SECTION I

1 a) Fill in the blanks with appropriate word(s) (1*5=5)

i) 8086 is --- bit microprocessor

ii) Number of bus cycle required to read word data stored from even address is---

iii) 8259 is programmable ------ controller.

iv) Expansion for USB is ------

v) 80486 is ---- bit microprocessor.

b) Write short notes on Centronics interface (5)

SECTION II

2 a) Explain the internal architecture of 8086 with neat block diagram (8)

b) Write the function of following pin signals i)NMI ii)RESET (4)

c) Calculate physical address if (CS)=2000h (IP)=43AEh (3)

3 a) Explain the following instruction of 8086 (6)

i) XLAT  ii)IMUL iii)ESC

b) Explain the block diagram of memory organization of 8086 system (5)

c) Explain procedure operation using CALL and RET (4)

4 a) Write a program to find largest of five numbers (5)

b) Explain the following addressing modes with example (6)

i) Indirect ii) Based-indexed iii) Register
c) What is assembler directive? explain the following assembler directives
   i) ASSUME ii)DW

SECTION III

5 a) Write a program to add two 16 bit numbers
    b) Explain interrupt cycle when initiated by external device
    c) Explain program development steps in executing assembly language program

6 a) Explain 8086 minimum mode configuration with block diagram
    b) Write Read & Write bus timings of 8086 in Maximum mode configuration
    c) List Interrupt priorities of 8086 system

7 a) Write the block diagram of 8255 PPI and mention the mode of operations
    b) Explain the block diagram of 8251 and mention the mode of operations

SECTION IV

8 a) Explain the block diagram of advanced microprocessor
    b) Write block diagram of MMU and list its function

9 a) Explain memory hierarchy in an advanced microprocessor system
    b) Explain the concept of virtual memory with block diagram
    c) What is pipeline hazard? explain data hazard

10 a) Write any six features of Pentium processors
     b) Write the needs for bus standard and explain USB bus
     c) List the features 80486 & Pentium IV microprocessors

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